

also been amended to overcome a substantive rejection. Claims 1, 6, 11, and 16 are independent.

Requested action

Applicants respectfully request the Examiner to reconsider and withdraw the outstanding objection and rejection in view of the foregoing amendments and the following remarks.

Drawing objection

Step S108 of Figure 6 is objected to because the drum using amount is not identified by the letter "D". In response, while not conceding the propriety of the objection, Applicants are filing herewith a Request for Approval of Drawing Changes and a formal drawing correction of Figure 6 adding "D" after "Amount" in step S108 in Fig. 6, thereby obviating the objection.

Rejection

Claims 1-20 are rejected under 35 U.S.C. § 102(b) as being anticipated by Japanese Patent Document No. 9-120245 (Okano).

Response to rejection

In response, while not conceding the propriety of the rejection, independent Claims 1, 6, 11, and 16 have been amended. Applicants submit that as amended, these claims are allowable for the following reasons.

Independent Claim 1 relates to an image forming apparatus comprising a cartridge detachably mounted thereon. The cartridge includes a storage medium capable of storing electronic information and a part of plural process means for image formation including a

photosensitive body on which an electrostatic latent image is formed, charging means for charging the photosensitive body, development means for developing the electrostatic latent image formed on the photosensitive body, and exposing means for exposing the photosensitive body.

Claim 1 has been amended to recite that the image forming apparatus also comprises means for detecting a driven amount of the cartridge, and control means for changing exposure conditions for exposing the photosensitive body on the basis of the information stored in the storage medium.

Claim 1 has been further amended to recite that the storage medium stores, in advance (1) threshold information relating to a threshold value used to change the exposure conditions for the exposing means to expose the photosensitive body and (2) arithmetic coefficient information used to calculate the used amount of the cartridge, the storage medium having an area for storing information on the driven amount of the cartridge.

Claim 1 has also been amended to recite that the control means calculates the used amount information of the cartridge on the basis of the driven amount information and the arithmetic coefficient information, and when a value obtained by the calculation of the control means reaches the threshold value, the control means changes the exposure conditions for the exposing means.

Because the Office rejects this claim under 35 U.S.C. § 102 , the Office must cite a reference showing all the features recited therein. But the August 29, 2002 Office Action, which rejects the claims over the Okano patent, does not allege that this patent shows and does not specify the portion of this patent that shows a storage medium that stores, in advance (1) threshold information relating to a threshold value used to change the exposure conditions for the exposing means to expose the photosensitive body and (2) arithmetic coefficient information used to calculate the used amount of the cartridge, the storage medium having an area for storing information on the driven amount of the cartridge, as

recited by amended Claim 1. In addition, the August 29, 2002 Office Action does not allege that the Okano patent shows and does not specify the portion of this patent that shows control means that calculates the used amount information of the cartridge on the basis of the driven amount information and the arithmetic coefficient information, and that when a value obtained by the calculation of the control means reaches the threshold value, the control means changes the exposure conditions for the exposing means, as also recited by amended Claim 1.

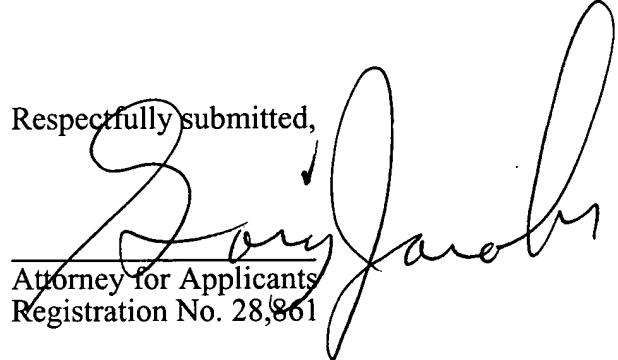
Therefore, the Office has not yet satisfied its burden of proof to show anticipation of Claim 1 over the Okano patent. For this reason, amended Claim 1 is allowable over the Okano patent. And because independent Claims 6, 11, and 16 have been amended in a similar manner, they are allowable for similar reasons.

The dependent claims are allowable for the reasons given with respect to the independent claims and because they recite features which are patentable in their own right. Individual consideration of the dependent claims is respectfully solicited.

In view of the above amendments and remarks, the claims are now in allowable form. Therefore, early passage to issue is respectfully solicited.

Applicants' undersigned attorney may be reached in our Washington, D.C. office by telephone at (202) 530-1010. All correspondence should continue to be directed to our below-listed address.

Respectfully submitted,



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MARKED-UP AMENDED SPECIFICATION

Please amend the paragraph starting at page 3, line 21 and ending at page 4, line 6, as follows.

--Moreover, there is also a [thinkable] method of directly detecting the used amount of the photosensitive drum from a lowered charged potential of the drum or a reduced latent image contrast by using a surface potential sensor or the like. In this case, however, the surface potential sensor and an electric circuit for processing its output are required, and so the costs become high. In addition, as only the information on the photosensitive drum corresponding to the sensor's position is acquired, there is a possibility of detecting a partial defect, not necessarily capable of acquiring the information along the whole length of the drum.--

Please amend the paragraph starting at page 11, line 26 and ending at page 12, line 1, as follows.

--Fig. 1 is a [section] sectional view showing an embodiment of a process cartridge involved in the present invention;--

Please amend the paragraph starting at page 12, line 2 and ending at page 12, line 4, as follows.

--Fig. 2 is a [section] sectional view showing an embodiment of an image forming apparatus involved in the present invention;--

Please amend the paragraph starting at page 12, line 11 and ending at line 12, as follows.

--Fig. 5 is a block diagram showing the configuration of memory control involved in the present invention;--

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Please amend the paragraph starting at page 12, line 24 and ending at line 26, as follows.

--Fig. 9 is a [section] sectional view showing an embodiment of a developing apparatus rendered as a cartridge involved in the present invention; and--

Please amend the paragraph starting at page 14, line 13 and ending at line 27, as follows.

--The charging roller 2 is a conductive elastic body formed on a core surface, where both ends of the core are kept freely rotatable, and is pressure-welded to an outer face of the photosensitive drum 1 by predetermined pressure so as to rotate according to rotation of the photosensitive drum 1. The charging roller 2 undergoes, via the core from a high voltage power supply provided in the image forming apparatus main body, application of a superimposed voltage ($V_{ac} + V_{dc}$) of an AC component V_{ac} and a DC component V_{dc} having an inter-peak voltage V_{pp} that is twice or more of a charge start voltage, and the outer face of the photosensitive drum 1, being rotated, [is] uniformly undergoes a contact charging process by an AC application method.--

Please amend the paragraph starting at page 15, line 18 and ending at page 16, line 9, as follows.

--Negative charged magnetic one-component toner is used as the toner t accommodated in the toner container 4a. As for the components, a magnetic body grain 80 parts by weight for a styrene n-butyl-acrylate copolymer 100 parts by weight as a binding resin, two parts of a load current controlling agent of a mono-azo iron complex, and three parts of low molecular weight polypropylene as wax are melted and mixed by a two-axis extruder heated to 140 degrees C, and the cooled mixture is roughly decomposed by a hammer mill, and then the roughly ground matter is pulverized by a jet mill so that the acquired pulverized matter is air classified to acquire classified powder [of which] whose

weight average diameter is $5.0\ \mu\text{m}$. The classified article [of which] whose average grain size is $5.0\ \mu\text{m}$ is mixed with a hydrophobic silica powder 1.0 weight portion by a henschel mixer so as to acquire a developer. And those having a weight average grain size in the range of 3.5 to $7.0\ \mu\text{m}$ (mainly $6\ \mu\text{m}$ or so) are used.--

Please amend the paragraph starting at page 21, line 11 and ending at line 25, as follows.

--Fig. 3 shows [a] the relationship between the durable number of sheets, that is, the number of printed sheets and the light portion potential, that is, an exposed portion potential [as to] of the photosensitive drum [of which] whose photosensitive materials are different between manufacturing lots A and B. As is understandable from the drawing, the light portion potential gradually [lowers] decreases as [opposed to increase of] the number of printed sheets increases in the photosensitive drum of the manufacturing lot A, whereas the potential remarkably [lowers] decreases at the beginning of [endurance] printing and there is little change from the middle of the printing operation and thereafter in the drum of the manufacturing lot B. Such variation in the light portion potential due to the use of the photosensitive drum [turns to] creates a variation in the image.--

Please amend the paragraph starting at page 22, line 5 and ending at line 7, as follows.

--(1) [To equip the] The cartridge C is equipped with the memory 22 and [store] stores the time during which the cartridge C was driven in the image forming apparatus main body.--

Please amend the paragraph starting at page 22, line 8 and ending at line 15, as follows.

--(2) [To store in the] The memory 22 stores threshold information on the above used amount determined by the characteristics of the photosensitive materials of the photosensitive drum 1 used on each cartridge and coefficient information on an arithmetic expression determined by contact pressure of the photosensitive drum 1 and the cleaning blade 10 and the electrical characteristic of the charging roller 2.--

Please amend the paragraph starting at page 22, line 16 and ending at line 26, as follows.

--(3) [To calculate, in] In the image forming apparatus main body, the used amount of the cartridge C with the driving time and the coefficient information stored in the memory 22 of the cartridge C are calculated, and [compare] the calculated value is compared to the threshold information on the used amount of the photosensitive drum in the memory 22 of the cartridge. And [to change] the amount of exposure to light is changed when the calculated value becomes the threshold value. Moreover, a table corresponding to the threshold and the amount of exposure to light should be created and stored in the memory 22.--

Please amend the paragraph starting at page 24, line 12 and ending at page 25, line 1, as follows.

--A drum used amount D is calculated in the computing portion 26 by a conversion expression $D = A + B \times \phi$ using a value B integrating photosensitive drum rotation time data from the photosensitive body rotation instructing portion 27, a value A integrating charging bias application time data from the charging bias application time detecting portion 28, and the weighting coefficient ϕ read from the memory 22, and is stored in the apparatus main body memory 13 for storing apparatus main body data. The drum used

amount D that is integrated and stored is compared to the threshold α in the memory 22 of the cartridge C by the computing portion 26. As a result of the comparison, when the drum used amount D becomes larger than the threshold α , a control signal is sent from the control portion 25 to a laser exposure unit [29] 3 so as to change the amount of exposure to light by the laser.--

Please amend the paragraph starting at page 26, line 13 and ending at line 17, as follows.

--S111: A switching signal is transmitted from the control portion 25 to a laser exposure unit [29] 3 shown in Fig. 5 so that the amount of exposure to light is changed.
<End>--

MARKED-UP AMENDED ABSTRACT

Please amend Abstract for the Abstract starting at page 38, line 1 and ending at line 21, as follows.

--ABSTRACT OF THE DISCLOSURE

[An object of the present invention is to provide an] An image forming apparatus [that] has a cartridge detachably mounted thereon, having unitized as one piece, one or more of a photosensitive body on which an electrostatic latent image is formed, a charging device for charging the photosensitive body, and a developing device for developing the electrostatic latent image formed on the photosensitive body and including a storage medium capable of storing electronic information, an exposing device for exposing the photosensitive body, and a device for detecting a used amount of the cartridge[, wherein the]. The storage medium has information stored in advance for determining an exposure condition specific to each cartridge and has an area for writing [a] used amount information of the cartridge detected by the detecting device, and performs control for changing the exposure condition of the photosensitive body based on the information for determining the exposure conditions and the used amount information.--

MARKED-UP AMENDED CLAIMS

1. (Amended) An image forming apparatus comprising:

a cartridge detachably mounted thereon, said cartridge including a storage medium capable of storing electronic information and a part of plural process means for image formation including [having unitized as one piece one or more of] a photosensitive body on which an electrostatic latent image is formed, charging means for charging said photosensitive body, [and developing] development means for developing the electrostatic latent image formed on said photosensitive body, and exposing means for exposing said photosensitive body; [and including a storage medium capable of storing electronic information; exposing means for exposing said photosensitive body; and]

means for detecting a driven [used] amount of said cartridge; and control means for changing exposure conditions for exposing said photosensitive body on the basis of the information stored in said storage medium,

wherein said storage medium stores, in advance (1) threshold information relating to a threshold value used to change the exposure conditions for said exposing means to expose said photosensitive body and (2) arithmetic coefficient information used to calculate the used amount of said cartridge, said storage medium having an area for storing information on the driven amount of said cartridge, and

wherein said control means calculates the used amount information of said cartridge on the basis of the driven amount information and the arithmetic coefficient information, and when a value obtained by the calculation of said control means reaches the threshold value, said control means changes the exposure conditions for said exposing means [has information stored in advance for determining an exposure condition specific to each cartridge and has an area for writing a used amount information of said cartridge detected

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by said detecting means, and performs control for changing the exposure condition of said photosensitive body based on said information for determining the exposure conditions and said used amount information].

2. (Amended) An image forming apparatus according to claim 1, wherein the used amount information of said cartridge is the rotation time of said photosensitive body, the bias application time for said charging means, a value obtained by weighting the rotation time using the arithmetic coefficient information, or a value obtained by weighting the bias application time using the arithmetic coefficient information [said charging means or said developing means, bias application time for said charging means or said developing means, a remaining amount of developer, number of printed sheets, number of image dots forming an image on said photosensitive body, an integrated value of luminescent time of a laser when exposing said photosensitive body, film thickness of said photosensitive body, or value combined by assigning weights to the respective used amounts].

3. (Amended) An image forming apparatus according to claim 1, wherein said threshold [the] information used to change the [for determining] exposure conditions for said exposing means includes at least one of a value related to [condition specific to said cartridge includes at least one of] a manufacturing lot of said photosensitive body, a value [according] related to an electrical characteristic of said charging means, and information [according] related to the contact pressure of [the] a cleaning blade abutting against said photosensitive body.

5. (Amended) [The] An image forming apparatus according to claim 1, wherein said storage medium has a table corresponding to said threshold information and said exposure [condition] conditions.

6. (Amended) A cartridge detachably mountable on a main body of an image forming apparatus, [having unitized as one piece one or more of a photosensitive body on which an electrostatic latent image is formed, charging means for charging said photosensitive body, and developing means for developing the electrostatic latent image formed on said photosensitive body and including a storage medium capable of storing electronic information, said image forming apparatus] the image forming apparatus including a photosensitive body on which an electrostatic latent image is formed, charging means for charging the photosensitive body, developing means for developing the electrostatic latent image formed on the photosensitive body, and exposing means for exposing the photosensitive body, said cartridge comprising: [exposing means for exposing said photosensitive body; and means for detecting a used amount of said cartridge,]

a storage medium capable of storing electronic information,

wherein said storage medium stores, [has information stored] in advance, (1) threshold information relating to a threshold value used to change the exposure conditions for the exposing means to expose the photosensitive body and (2) arithmetic coefficient information used to calculate the used amount of said cartridge, said storage medium having an area for storing information on the driven amount of said cartridge [for determining an exposure condition specific to each cartridge and has an area for writing a used amount information of the cartridge detected by said detecting means, and performs control for changing exposure conditions of said photosensitive body based on said information for determining the exposure condition and said used amount information].

7. (Amended) A cartridge according to claim 6, wherein the [used] driven amount information of said cartridge is the rotation time of [said] the photosensitive body or the bias application time for the charging means[, said charging means or said developing means, bias application time for said charging means or said developing means, a remaining amount of developer, the number of printed sheets, the number of image dots

forming an image on said photosensitive body, an integrated value of luminescent time of a laser when exposing said photosensitive body, film thickness of said photosensitive body, or value combined by assigning weights to the respective used amounts].

8. (Amended) A cartridge according to claim 6, wherein said threshold [the] information used to change the exposure conditions for the exposing means includes at least one of a value related to [for determining the exposure condition specific to said cartridge includes] a manufacturing lot of [said] the photosensitive body, a value related to an electrical characteristic value of [said] the charging means, [or] and information [according] related to the contact pressure of [the] a cleaning blade abutting against [said] the photosensitive body.

10. (Amended) A cartridge according to claim 6, wherein said storage medium has a table corresponding to said threshold information and said exposure [condition] conditions.

11. (Amended) An image forming system for forming an image [in] on a recording medium by using a cartridge detachably attachable to an image forming apparatus, [said system comprising:

a) said image forming apparatus including exposing means, means for detecting a used amount of said cartridge, and control means for changing an exposure condition of said photosensitive body based on information in a storage medium; and

b) said cartridge including one or more of a photosensitive body on which an electrostatic latent image is formed by being exposed by said exposing means, charging means for charging said photosensitive body, and developing means for developing the electrostatic latent image on said photosensitive body, and the storage medium having information stored in advance for determining an exposure condition specific to each

cartridge and having an area for writing the used amount information of said cartridge detected by said detecting means,

wherein said control means changing exposure condition of said photosensitive body based on the information in said storage medium] said system comprising:

said cartridge; and

said image forming apparatus,

wherein said cartridge includes a storage medium capable of storing electronic information and a part of plural process means for image formation including a photosensitive body on which an electrostatic latent image is formed, charging means for charging said photosensitive body, and developing means for developing the electrostatic latent image formed on said photosensitive body,

wherein said image forming apparatus includes exposing means for exposing said photosensitive body, means for detecting a driven amount of said cartridge, and control means for changing exposure conditions for exposing said photosensitive body on the basis of the information stored in said storage medium,

wherein said storage medium stores, in advance (1) threshold information relating to a threshold value used to change the exposure conditions for said exposing means to expose said photosensitive body and (2) arithmetic coefficient information used to calculate the used amount of said cartridge, said storage medium having an area for storing information on the driven amount of said cartridge, and

wherein said control means calculates the used amount information of said cartridge on the basis of the driven amount information and the arithmetic coefficient information, and when a value obtained by the calculation of said control means reaches the threshold value, said control means changes the exposure conditions for said exposing means.

12. (Amended) An image forming system according to claim 11, wherein the used amount information of said cartridge is the rotation time of said photosensitive body, [said

charging means or said developing means, bias application time for said charging means or said developing means, a remaining amount of developer, the number of printed sheets, the number of image dots forming an image on said photosensitive body, an integrated value of luminescent time of a laser when exposing said photosensitive body, film thickness of said photosensitive body, or value combined by assigning weights to the respective used amounts] the bias application time for said charging means, a value obtained by weighting the rotation time using the arithmetic coefficient information, or a value obtained by weighting the bias application time using the arithmetic coefficient information.

13. (Amended) An image forming system according to claim 11, wherein said threshold [the] information used to change the exposure conditions for said exposing means [for determining exposure condition specific to said cartridge] includes at least one of a value related to a manufacturing lot of said photosensitive body, a value [according] related to an electrical characteristic of the charging means, and information [according] related to the contact pressure of [the] a cleaning blade abutting against said photosensitive body.

15. (Amended) An image forming system according to claim 11, wherein said storage medium has a table corresponding to said threshold information and said exposure [condition] conditions.

16. (Amended) A storage medium [capable of] for storing electronic information, wherein said storage medium is mounted on a cartridge detachably mountable on a main body of an image forming apparatus [comprising means for detecting a used amount of said cartridge, said medium having unitized as one piece one or more of a photosensitive body on which an electrostatic latent image is formed, charging means for charging said photosensitive body, and developing means for developing the electrostatic latent image

formed on said photosensitive body], wherein the image forming apparatus includes means for detecting a driven amount of the cartridge, a photosensitive body on which an electrostatic latent image is formed, charging means for charging the photosensitive body, developing means for developing the electrostatic latent image formed on the photosensitive body, and exposing means for exposing the photosensitive body,

wherein said storage medium stores, in advance (1) threshold [has] information relating to a threshold value used to change exposure conditions for the exposing means to expose the photosensitive body and (2) arithmetic coefficient information used to calculate a used amount of the cartridge, and

wherein said storage medium has an area for storing information on the driven amount of the cartridge [stored in advance for determining an exposure condition specific to each cartridge and has an area for writing a used amount information of said cartridge detected by said detecting means].

17. (Amended) A storage medium according to claim 16,

wherein the [used amount information of said cartridge is rotation time of said photosensitive body, said charging means or said developing means, bias application time for said charging means or said developing means, a remaining amount of developer, number of printed sheets, number of image dots forming an image on said photosensitive body, an integrated value of luminescent time of a laser when exposing said photosensitive body, film thickness of said photosensitive body, or value combined by assigning weights to the respective used amounts] arithmetic coefficient information used to calculate the used amount of the cartridge is information for weighting the rotation time of the photosensitive body or the bias application time for the charging means.

18. (Amended) A storage medium according to claim 16,

wherein the threshold information used to change the [for determining] exposure conditions for the exposure means to expose the photosensitive body includes at least one of a value related to [condition specific to said cartridge includes] a manufacturing lot of [said] the photosensitive body, a value related to an electrical characteristic value of [said] the charging means, [or] and information [according] related to the contact pressure of [the] a cleaning blade abutting against [said] the photosensitive body.

20. (Amended) A storage medium according to claim 16, wherein said storage medium stores [wherein said storage medium has] a table corresponding to said threshold information and said exposure [condition] conditions.

FIG. 6

